

Notice of Allowability

Application No.

10/696,854

Examiner

Stephen J Stein

Applicant(s)

MULLER ET AL.

Art Unit

1775

EO

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 18-23.
3. ☒ The drawings filed on 30 October 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).


* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 10/30/2003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


Stephen J Stein
Primary Examiner
Art Unit: 1775

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

IN THE SPECIFICATION

Please amend the specification by amending the following paragraph before the first line:

--This Application is a Divisional of prior Application Serial No. 09/773,443, now U.S. 6,693,051, filed on October 2, 2003 [, currently pending,] to David A. Muller, et al. The above-listed Application is commonly assigned with the present invention and is incorporated herein by reference as if reproduced herein in its entirety under Rule 1.53(b). --

Allowable Subject Matter

2. Claims 18-23 are allowed over the prior art of record.

Reasons for Allowance

3. The following is an examiner's statement of reasons for allowance:

None of the prior art of record teaches or suggests a device comprising a dielectric layer formed between a conductive layer and upon a silicon substrate, the dielectric layer comprising a layer of silicon oxide, SiO_x, wherein x is less than 2, and having a dielectric constant greater than about 3.9 and less than or equal to about 12. The prior art of record further fails to teach or suggest a transistor comprising an electrode, a silicon substrate, and a gate dielectric layer formed between the electrode and the silicon substrate, the gate

Art Unit: 1775

dielectric layer comprising at least one layer of silicon oxide, SiO_x , wherein x is less than 2, and has a thickness of about 5 angstroms and a dielectric constant greater than about 3.9 and less than or equal to 12.

The following is a summary of the closest prior art of record.

DE 4243410A1 (Huck) teaches a device comprising a glass substrate, a sputtered metal film on the glass substrate and a sub-stoichiometric film of SiO_x wherein x is 1.9 or less (See Abstract). Huck fails to teach or suggest that the sub-stoichiometric film of SiO_x has a dielectric constant between 3.9 and 12 and fails to teach the layer between the metal layer and a silicon substrate.

Other prior art of record, such as US 6,057,584 (Gardner et al.), discloses a semiconductor device comprising a gate insulating layer between a silicon substrate and an electrode which comprises an oxide such SiO_2 which has a dielectric constant of about 4.2 and a thickness between 3 to 5 angstroms (See col. 3 and 4). Gardner fails to teach or suggest that the Silicon dioxide gate insulating layer is in the form of SiO_x wherein x is less than 2.

Still other prior art or record, such as US 6,274,903 (Nomoto et al), teaches a memory transistor device comprising a sub-stoichiometric SiO_x film wherein $x < 2$ on device with a silicon semiconductor layer which prior to the application of the electrode is irradiated with an energy beam to cause the non-stoichiometric film to convert into silicon dioxide and silicon of the stoichiometric composition (See col. 12, lines 5-18). Nomoto fails to teach or suggest that sub-stoichiometric film of SiO_x remains on the substrate when the electrode is applied and further fails to teach or suggest that the SiO_x film has a dielectric constant between 3.9 and 12.

The prior art of record taken as a whole fails to teach or suggest the claimed invention.

Art Unit: 1775

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Stein whose telephone number is 572-272-1544. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m. If the attempts to reach the examiner are unsuccessful, the examiner's supervisor, Deborah Jones can be reached by dialing 572-272-1535. The official fax number is 703-872-9306.

March 4, 2004.



Stephen J. Stein
Primary Examiner
Art Unit 1775